

TETRARIA AND RELATED GENERA, WITH SPECIAL REFERENCE TO THE FLORA OF THE CAPE PENINSULA.

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The family Cyperaceae is well represented in the flora of the Cape Peninsula, and members of the sub-family Rhynchosporoideae (Schoeneae of Clarke) are to be found in a variety of habitats. All nine genera recorded in the Flora Capensis occur within the area. The inclusion of one, *Rhynchospora*, is based on a specimen collected by Ecklon on Table Mountain. Another, *Cladium*, represented by one species, is somewhat infrequent and is only found close to the margins of permanent vleis on the Cape Flats. The remaining seven genera are common. Recent work on the family has resulted in information that necessitates changes either in nomenclature or in generic definitions, and the purport of this paper is to deal with the problems which have arisen.

Tetraria is the largest genus and no understanding of the group of genera is possible without a more complete knowledge of this very important genus than has been available in the past. Most previous work has been done on a limited number of herbarium specimens and the plasticity of several of the species was therefore not recognised. However, before embarking on an account of recent additions to our knowledge, it is necessary to know something of the history of this genus, the very name of which is a puzzle to the uninitiated.

Tetraria was founded in 1812 by Palisot de Beauvois on a specimen collected at the Cape of Good Hope by du Petit-Thouars. This he named *Tetraria Thuarii* in honour of its discoverer. In 1819 a second species, *Tetraria compar*, was transferred to the genus by Lestiboudois. Towards the end of last century Clarke extended the genus so as to include thirty-one additional species, a few of them new, but for the most part species which had hitherto been placed in other genera. Since then several new species have been added, bringing the total number to forty-four.

In the course of field work during the last ten years it soon became apparent that the definition of *Tetraria* given by Clarke in the Flora Capensis, is insufficiently elastic to embrace all possible variations of the spikelet. Two ways of dealing with the problem are open. One is to break up the genus once more into a number of smaller genera. The

other is to retain the genus much as it is at present and amend the description. The writer has decided to follow the latter course as although the genus is not easy to define, the constituent species form a coherent whole with two exceptions. One of these is *Tetraria punctoria* C.B.Cl. No single feature will separate it from *Tetraria* but the sum of its differences is sufficient to place it apart. In this species several reduced leaves are found at the base of each flowering stem, only the uppermost developing a lamina, which is cylindrical and indistinguishable from a stem. The bracts of the spikelet are not definitely 2-ranked as they are in most species of *Tetraria*. The very long perianth bristles are unlike those of any *Tetraria*, so too is the unusually long style terminating in six branches. In the past this species was placed in a separate genus, *Buekia punctoria* Nees but unfortunately the generic name had been used earlier for an entirely different plant and therefore is not available under modern rules of nomenclature. It is therefore proposed to establish a new name for this genus, *NEESENBECKIA*, in commemoration of Nees von Esenbeck who made outstanding contributions to the knowledge of South African Cyperaceae during the early years of last century. The name of this plant therefore becomes *Neesenbeckia punctoria* (Vahl.) Levyns.

Some initial difficulties with regard to *Tetraria* present themselves at once. First of all the description in the *Flora Capensis* of the type species, *T. Thuarii* Beauv., does not agree with the original description of Palisot de Beauvois. Secondly there is considerable doubt about the type species itself of which there are no clear records. Such evidence as has been brought to light in the course of these researches is given below. *T. Thuarii* Beauv. was first described in a periodical not accessible in South Africa (*Mém. Sc. Nat. et Phys. de l'Inst. Imp. France*). Through the kind assistance of the Director of Kew the writer was able to obtain an extract from the journal. In view of what follows it seems worth while to quote the passage in full.

“ Dans le nombre des plantes que M. du Petit-Thouars a rapportées de ses voyages, et qu'il m'a communiquées, en me permettant d'en faire usage, quoiqu'il ne les eût pas encore publiées, il est une extrêmement remarquable, qu'il a trouvée au cap de Bonne-Espérance. Cette plante, ainsi que M. du Petit-Thouars l'avait remarqué, avant moi, sur les lieux et sur des individus frais, porte dans chaque épi trois sortes de fleurs. Les plus inférieures, munies seulement d'une bractée ou écaille, sans aucun organe de la génération ; les intermédiaires, ayant également une bractée, quatre étamines, un ovaire surmonté d'un style et de quatre stigmates, mais qui avorte pour l'ordinaire ; enfin, la dernière terminale, composée d'une bractée, d'une paillette mince et membraneuse, de huit étamines, d'un style bulbeux à sa

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base, divisé en deux, subdivisé en quatre stigmates, et le fruit à quatre angles très-saillants, entre chacun desquels se trouvent deux étamines geminées, ce qui en porte le nombre à huit, multiple de quatre. Je dois faire remarquer en passant, que cette singulière organisation dans la famille des Cypérées, a quelque analogie avec celle que M. du Petit-Thouars a remarquée dans la correspondance du nombre des étamines, du style et des stigmates dans les Polygonées, observation très-curieuse qu'il a communiquée à la Classe, dans un mémoire dont M. Desfontaines, notre confrère, lui a dernièrement rendu compte.

Certains caractères de cette plante pourraient la faire prendre pour le *Schoenus compar* des auteurs ; mais le nombre des stigmates, celui des angles du fruit, ainsi qu'on peut s'en assurer par la description et la figure de Rottboel, empêcheront toujours de la confondre.

La connaissance de ce nouveau genre, que je propose de nommer *Tetraria*, à cause de ses étamines, tantôt au nombre de quatre, tantôt de huit, qui est le multiple de quatre, de ses quatre stigmates, et de son fruit à quatre angles, et pour nom spécifique, *Thuarii*, afin de perpétuer le nom du Botaniste à qui la science en est redevable ; la connaissance de ce genre, dis-je, prouve évidemment que dans les Cypérées, le nombre des stigmates n'est pas aussi indifférent qu'on avait pensé, et que ce nombre étant généralement égal à celui des angles du fruit, fournit un caractère constant, naturel, et d'autant plus avantageux pour la formation des genres, que, ceux déjà institués, et qui renferment des espèces à deux et à trois stigmates, sont très-nombrueux et, par conséquent, très-difficiles pour la détermination et l'étude des espèces."

The salient points in the foregoing account may be summarised as follows :—

1. The specimen was given to Palisot de Beauvois by M. du Petit-Thouars.
2. It came from the Cape of Good Hope.
3. There is no description of any part of the plant but the inflorescence.
4. The stamens and styles are in multiples of four but in other respects it resembles *Schoenus compar* L.

Du Petit-Thouars was a well known French savant of his day. An account of his travels is given in Musée Botanique Delessert by Lasègue (1845) p. 437, and here we learn that he only spent a fortnight at the Cape during the summer months 1792-93, while on the way to Mauritius. Travelling in those days was slow and difficult and it seems highly improbable that a botanical explorer whose short stay was only an incident

on an expedition which did not have South Africa as one of its objectives, would move far from the coast with its rich and varied flora during his fortnight on land. This is of considerable importance for all the specimens identified as *Tetraria Thuarii* by C. B. Clarke came from remote inland localities.

An interval of about twenty years elapsed between the time the specimen was collected and its description by Palisot de Beauvois. The fact that the latter makes no mention of any of the vegetative parts suggests that these were not seen when the description was drawn up and that the type specimen was probably imperfect. This point is of some importance for the location of the type specimen is not known and it appears likely that a specimen consisting of an inflorescence only which was part of the herbarium of Palisot de Beauvois and is now at Geneva, is actually the type. This specimen was collected by du Petit-Thouars in whose own herbarium in Paris the species is not represented. Unfortunately there are a few features connected with this presumed type which make a definite decision difficult. There is an old label pasted on the sheet which bears a short diagnosis which does not agree with either the description of Palisot de Beauvois or the two dissected spikelets which are in an envelope attached to the sheet. The spikelets fit the published description reasonably well though each spikelet appears to have three flowers instead of two as recorded. On the envelope containing the dissections is written in a handwriting distinct from that which penned the diagnosis, *Tetraria Thuarii*. On the label is a statement that the plant came from "insula Borboniae". There is no doubt about the plant itself which is *Tetraria compar* (L.) Lestib., a characteristic Cape plant of which there are no records other than this, outside South Africa. Its distribution within South Africa is limited to part of the south western coastal belt, and it is therefore extremely unlikely that it is also present on an island as remote as Reunion. In view of the fact that the label on which this puzzling record is given, is not a field label the writer suspects that du Petit-Thouars himself wrote the label including the diagnosis, after his return to France and in error gave the wrong locality. In that case the envelope with the dissections and the name *Tetraria Thuarii*, was probably added by Palisot de Beauvois when he described the species. In 1895 a further label was attached to the sheet by C. B. Clarke identifying the plant quite correctly as *Tetraria compar* Lestib. Clarke evidently did not regard this as the type of *Tetraria Thuarii* for his description of that species is entirely different from that of Palisot de Beauvois and refers to another species altogether.

For the reasons given above the writer considers that the specimen collected by du Petit-Thouars and now in Geneva is probably the type.

The supposition that the type of *Tetraria Thuarii* came from somewhere on or not far from the Cape Peninsula is strengthened by Beauvois' statement that it resembles *Schoenus compar*, only differing in the fact that its floral parts are in fours. *Schoenus compar*, now *Tetraria compar*, is a very common plant on the Cape Peninsula and has proved to be the most variable species in the genus. In the majority of cases perianth bristles are lacking though in a number of flowers either small lumps or minute, delicate bristles have been observed by the writer. No flower has ever been seen with conspicuous bristles. It is noteworthy that Beauvois does not mention bristles, while Clarke in the *Flora Capensis* gives as a feature of *T. Thuarii* 5—6 scabrous bristles, rather longer than the nut. There is no doubt at all that this is an accurate reflection of Clarke's conception of the species for in his *Illustrations of Cyperaceae* (Tab. XCII. 3, 4) he shows a plant in which the bristles are an outstanding feature. *Tetraria compar* has a variable number of stamens (3—8), and the number of style branches may be either 3 or 4. The numbers are not constant in different flowers of the same spikelet as may be seen from the table on p. 79. In du Petit-Thouars' presumed type all the flowers examined by Beauvois had their parts in fours, and thus a new genus was created, based on a supposed numerical constancy which has proved to be non-existent. The fact that the name of a genus is unsuitable is no reason for discarding it according to the rules of nomenclature, and thus we find *Tetraria* legitimately established for a group of species in which the number four is exceptional. *T. compar* is the only species in the genus which will fit Beauvois' description, and there can be little doubt that it is the type species. As the epithet *compar* is older than *Thuarii*, *T. Thuarii* Beauv. becomes a synonym of *T. compar* (L.) Lestib.

The sinking of *T. Thuarii* Beauv. in *T. compar* Lestib. necessitates the re-naming of *T. Thuarii* C.B.Cl. non Beauv. On a recent botanical expedition the writer was fortunate in finding this species growing along an irrigation furrow in the mountains close to Citrusdal in the Clanwilliam district. The plants collected fit Clarke's description (*Fl. Cap. VII* p. 283) and figures (*Illustr. Cyp. Tab. XCII 3, 4*). They also match the following specimens:— Schlechter 7512 (*Bolus Herb. and Herb. Delessert*), and Wallich, Ecklon & Zeyher 106, Drège (*Herb. Delessert*). These were placed by C. B. Clarke under *Tetraria Thuarii*. A careful examination soon showed that the species is closely allied to *Macrochaetium hexandrum* (see p. 80) and it is therefore proposed to remove it from *Tetraria*. The earliest name given to this species is *Cyathocoma Ecklonii* (Nees in *Linnaea* X p. 195) and it therefore becomes *Macrochaetium Ecklonii* (Nees) Levyns comb. nov.

In common with all other genera of the sub-family to which *Tetraria* belongs, it has spikelets of a cymose type. In the majority of species the spikelet consists of several distichous bracts, only the two uppermost of which are fertile. The lower flower is functionally male with an abortive gynoecium, the upper bisexual. The number of stamens in both flowers is three, and the number of style branches is also three. Clarke recognised only two species consistently not in agreement with the above definition: *T. cuspidata* and *T. crinifolia*. In the former there is only one flower in the spikelet while in the latter the spikelets are unisexual, those in the upper part of the plant being male, those lower down female. There can be little doubt that Clarke was right in including both these species in *Tetraria*. The problems which arise in connection with *T. cuspidata* will be dealt with later in this paper for it is now quite clear that *T. cuspidata* sensu C.B.Cl. is a group of species. At this point it is significant to note that plants have been found in which spikelets on the same individual sometimes have one flower, sometimes two as in a typical *Tetraria*. In *Tetraria variabilis*, a new species which is described below, the spikelets have one flower only as in *Tetraria cuspidata* but the spikelet may be either bisexual or male. Occasionally in this new species a plant may be found bearing male spikelets only. These, however, are not the only species showing a departure from the normal spikelet. *T. flexuosa* C.B.Cl. frequently has both flowers bisexual and fertile, while occasionally spikelets may be found with two male flowers below the bisexual flower. In several other species exceptional spikelets have been recorded from time to time. The most variable species is *T. compar* Lestib. which, as has been shown, is almost certainly the type species of the genus. The number of flowers in the spikelet ranges from two to four, three being the most common number under normal circumstances. However in very vigorous plants such as appear after a veld fire, four flowers are often found. Comparatively few spikelets have only two flowers. In a small number of cases a sterile bract has been noted above the flowers. Variability in *T. compar* is not confined to numbers of flowers but extends also to their relative positions in the spikelet and to the number of stamens and style branches. These features are illustrated in the following table which is based on spikelets selected at random from plants in a given area and from plants in different localities. In a few cases all the spikelets in an inflorescence were dissected and here too the same variability was encountered. About one hundred spikelets have been dissected and the table has been drawn up from representative spikelets so as to give as accurate a picture as possible.

It will be noted that the writer has not seen any flowers with eight stamens among the plants collected by her, seven being the highest

TABLE.

Locality from which the Specimen was Collected.	Flower 1.	Flower 2.	Flower 3.	Flower 4.
Summit of Table Mountain	Male 4 3 5 3 3 6 6 6 "	Male 6 4 4 6 4 4 5 Bisexual 5	Bisexual 4 4 6 4 4 "	Male 4 4 4 4 4 4 4 Bisexual "
Smitswinkel Bay (After Fire)	Male 4 3 5 3 3 3 4 "	Male 3 3 3 3 3 4 "	Bisexual 4 3 3 4 4 Male "	Male 4 4 4 4 4 Bisexual "
Camps Bay	Male 6 3 7 3 6 "	Male 5 3 6 3 "	Bisexual 4 3 "	Male 3 3 3 3 3 Bisexual "
Camps Bay (After Fire)	Male 6 3 6 3 4 "	Male 4 3 5 3 "	Male 4 3 3 3 3 Bisexual "	Male 3 3 4 4 3 Bisexual "
Kirstenbosch	Male 4 4 "	Bisexual 7 5 "	Male 4 3 3 3 3 Bisexual "	Male 4 3 3 3 3 Bisexual "

Table illustrating the variability of the spikelet in *Tetraria compar*. The term "male" is used to indicate a flower in which the gynoecium is without function. Flower 1 is the lowest flower in the spikelet.

number. However, eight stamens have been recorded by other workers. No spikelet dissected up to the present is an exact match of that of Beauvois' type species which was stated to have two flowers, the lower with four stamens and four styles, the upper with eight stamens and four styles. A glance at the table will show that these conditions are very nearly satisfied by one of the Kirstenbosch spikelets, and it comes well within the bounds of probability that an exact match will eventually be found.

With *Tetraria punctoria* C.B.Cl. removed to *Neesenbeckia*, *T. triangularis* C.B.Cl. is the only remaining species found on the Cape Peninsula, showing a departure from the typical spikelet. In *T. triangularis* the flowers are normal in their number and position but the stamens vary from six to eight and the style branches from seven to nine.

The facts given above make it apparent that *Tetraria* is a genus which does not lend itself to a precise definition such as that given by Clarke in the Flora Capensis. In spite of these difficulties the fact remains that *Tetraria* is a natural group of species and the genus is well worth upholding. Widening the scope of *Tetraria* at once introduces difficulties in the definition of certain other genera which will now be considered.

Macrochaetium is a genus founded by Steudel for a species which has suffered more than a normal share of vicissitudes. It was first authentically published as *Carpha hexandra* Nees. (Linnaea X p. 193, 1835-6). About a year later it became *Ideleria Neesii* Kunth. In 1845 it was once more described as *Elynanthus Kraussii* Hochst. In 1855 it became *Macrochaetium Dregei* Steud., a name which was later used by Clarke in the Flora Capensis. In 1874 *Cyathocoma Neesii* Boeck. was added to the list. The adoption of International rules of nomenclature led to still further changes and in the past twenty years the same plant has been named *Ideleria hexandra* Pfeiffer, *Macrochaetium hexandrum* Pfeiffer and *Macrochaetium Neesii* Kükenthal. A wide choice of names is therefore available. *Macrochaetium hexandrum* (Nees) Pfeiffer is the correct name for the type species under modern rules of nomenclature. Kükenthal (Cyperaceae novae vel minus cognitae X, Fedde Rep. XXIX p. 187, 1931) claimed that the epithet *hexandrum* was not legitimate but he overlooked the fact that although Nees first published *Carpha hexandra* without a description, he subsequently remedied the defect.

The genus is undeniably very closely allied to *Tetraria*, and future research may lead to its incorporation in that genus. With our present imperfect knowledge of this group of plants it seems desirable to retain *Macrochaetium* in the meantime. As in the case of certain species of *Tetraria* *Macrochaetium hexandrum* too shows considerable variability in its spikelet. Usually there are two flowers, one male with an abortive

gynœceum, the other bisexual, but the relative positions are not fixed. In about half the two-flowered spikelets examined the arrangement is as in *Tetraria* but in the other half the bisexual flower occurs below the male. Occasionally spikelets are found with only one flower which is bisexual. Less often the rudiments of a third flower are to be found above the other two. In view of the range of structure exhibited in the spikelet of *Tetraria compar* and others it becomes impossible to separate *Macrochaetium* from *Tetraria* on the positions and numbers of its flowers. However, the spikelet has fewer bracts than is usual in *Tetraria* and they are more or less spirally arranged. There are six rather long perianth bristles and six stamens. Taken together these characters support the view that *Macrochaetium* is sufficiently distinct from *Tetraria* to warrant generic rank.

A genus which approaches *Macrochaetium* closely is *Asterochaete*. The species which belong to this genus are placed under *Carpha* in the *Flora Capensis*. However they are confined to southern Africa and on floral structure they merit their separation from *Carpha*. The name *Asterochaete*, originally given by Nees is therefore adopted. The spikelet approaches that of *Macrochaetium* closely but differs externally in its two-ranked green bracts. There are two flowers both of which may be bisexual though the upper is frequently male with an abortive gynœceum. The perianth bristles are much stouter than those of *Macrochaetium* and it has only three stamens whereas *Macrochaetium* has six. Two species occur on the Cape Peninsula, *A. glomerata* (Thunb.) Nees and *A. capitellata* Nees.

Closely linked with *Asterochaete* is *Trianoptiles* which, as has been shown previously, (Levyns: Journ. S.Af. Bot. IX, p. 21, 1943) differs in having, in addition to the normal aerial spikelets, some basal which are female and produce tuber-like fruits. This feature, added to differences in the perianth, serve to separate the genus from its allies. No changes are necessary in the two remaining genera, *Schoenus* and *Epischoenus*, though the number of species in the latter growing on the Cape Peninsula has risen from one to three. Some new species are described in Journ. S. Af. Bot. XIII, pp. 53-58, 1947.

Work on the *Tetrarias* of the Cape Peninsula has shown that the genus is far better represented in the area than was formerly supposed. Bolus and Wolley Dod in the list compiled in 1904 recorded seventeen species of which seven had not been seen by them. Two of these, *T. Bolusii* and *T. Wallichiana*, have not been found by the present writer and it seems probable that neither occurs within the area. *T. rottboelioides* C.B.Cl. is, in the writer's opinion, a form of *T. bromoides* (Lam.)

Pfeiffer formerly known as *T. Rottboellii* C.B.Cl. This and the removal of *T. punctoria* to a separate genus, *Neesenbeckia*, reduces the number of species to thirteen. However, three species not previously recorded from the area have been found, viz. :— *T. crinifolia* C.B.Cl., *T. capitellata* C.B.Cl. and *T. brevicaulis* C.B.Cl. The last named species is identified as *Costularia brevicaulis* C.B.Cl. in the Flora Capensis but it is a typical *Tetraria* with close affinities to *T. eximia* C.B.Cl. and *T. thermalis* C.B.Cl. Clarke had previously placed this plant in *Tetraria* but evidently later failed to find the abortive gynoecium in the lower flower. In the writer's experience this is always present and the species now reverts to the genus in which it was originally placed. There are ten new species of *Tetraria* about to be described, bringing the total up to twenty six.

A peculiar feature of many species is the slow rate at which the inflorescence develops. Sometimes months elapse between the time when the spikelets are formed and the time at which the reproductive structures within mature. This peculiarity accounts for the very large number of immature spikelets which one encounters in herbarium material. Another peculiarity is that bracts which when young are aristate, later shed their needle-like points so that inflorescences collected at different times from the same plant may have a totally different appearance. There can be little doubt that a species such as *T. aristata* C.B.Cl. is merely a youthful form of some other species.

T. cuspidata sensu C.B.Cl. is clearly a group of species the separation of which presents innumerable difficulties. When the scope of the present enquiry is extended to South Africa as a whole, clues may present themselves. All that is attempted here is to describe as new species those forms which field experience, extending over more than ten years, has shown to be distinct in several definite characteristics, both morphological and ecological. The new species are as follows :— *T. graminifolia*, *T. exilis*, *T. autumnalis*, *T. crassa*, *T. variabilis*, *T. paludosa* and *T. compacta*. Two of these have previously been given sub-specific rank by Kükenthal (loc. cit.), viz. :— *T. crassa* as *T. cuspidata* forma *robustior*, and *T. exilis* as *T. cuspidata* forma *gracilis*. The epithet *cuspidata* is being retained for a common species which agrees well with Rottboell's figure (Descr. et Ic. 66 t. 18 Fig. 3). Unfortunately no flowers or fruit are depicted but the author has little doubt that this species, of which an emended description is given below, is the plant which was originally described as *Schoenus cuspidatus*.

The separation of seven new species from the *cuspidata* group still leaves many problems unsettled. For example considerable variability was observed in what at first sight appeared to be a normal community of *T. cuspidata*, regenerating after a fire on the slopes of Kapitein's Peak at Hout Bay. It is possible that the aberrant forms are merely a temporary

expression of the effects of burning and that the plants will in due course revert to normality. A single case will suffice to show that this view is possible. One plant had long, slender straight leaves superficially very different from the short, often curled leaves of typical *T. cuspidata*. Otherwise it was perfectly normal. In *Ficinia*, another very common Cyperaceous genus, the same phenomenon has been observed in two cases. In *Ficinia elongata* Boeck. and *Ficinia brevifolia* Kunth. species which normally have a rudimentary lamina, well developed leaves appear temporarily after a fire but in due course the plants revert to the normal, almost leafless condition. Cases of parallel variation in allied species or genera are a commonplace to field workers. The writer is of the opinion that if a particular stimulus can induce unusually vigorous leaf development in one genus, then with the same stimulus similar results may be expected in other genera within the same circle of affinity. The fact that the effects noted are of temporary duration does not affect the point at issue.

In view of our incomplete knowledge of these members of Cyperaceae the present account must be regarded merely as a preliminary contribution to the study of an exceedingly difficult group.

***Tetraria cuspidata*, (Rottb.) C.B.Cl. emend. Levyns.**

A densely tufted perennial about 60 cm. high. Leaves all basal, usually much less than half the length of the flowering stems, very slender and wiry: the sheath dark red, firm: the lamina flat at the base but curved to form a shallow channel, the margin beset with short, stiff hairs, soon becoming rather solid and grooved, ultimately terete: the ligule firm, shortly 2-lobed, the lobes obtuse (Fig. 1a). Aerial stems slender, bearing numerous dark brown spikelets in a not very much contracted panicle. Bracts similar to the leaves, the lower overtopping inflorescence. Spikelets 6 mm. long or a little less, broadly lanceolate, 1-flowered, the bracts 2-ranked. Bracts about 7, the lower cuspidate, the upper acute. (Fig. 2a). Perianth bristles none. Stamens 3. Style scarcely any, the 3 branches arising at the apex of the conical beak. (Fig. 3a). Fruit broadly ellipsoidal, trigonous, with a well developed hispid beak. (Fig. 3b).

Flowering season: August to November.

DESCRIPTIONS OF NEW SPECIES.

***Tetraria compacta*, Levyns sp. nov.**

T. cuspidata (Rottb.) C.B.Cl. affinis sed foliis longioribus, rigidioris, spiculis flavo-brunneis, confertis, stylis elongatis differt.

A densely tufted perennial, 60 cm. high or less. Leaves basal, usually at least half as long as the flowering stems, much more rigid than in *T. cuspidata*: the sheath dark red, firm: the lamina flattened and

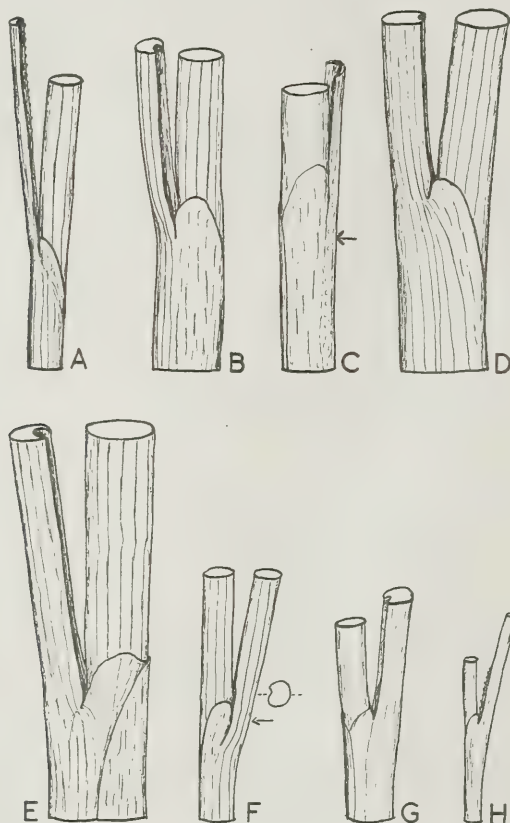


FIG. 1. Base of the lamina and top of the sheath, showing ligule and portion of the flowering stem. (a) *T. cuspidata*, (b) *T. compacta*, (c) *T. graminifolia*, (d) *T. paludosa*, (e) *T. crassa*, (f) *T. variabilis*, (g) *T. autumnalis*, (h) *T. exilis*. An arrow indicates the level at which the ligule becomes free from the lamina in two cases. All $\times 2\frac{1}{2}$.

shallowly channelled at the base, the margin beset with short stiff hairs, becoming solid and grooved shortly above the ligule, ultimately terete: the ligule firm, 2-lobed, the lobes obtuse, rather larger than those of

T. cuspidata. (Fig. 1b). Aerial stems slender, bearing numerous yellow-brown spikelets in a much contracted panicle. Bracts similar to the leaves, rigid, the lower overtopping the inflorescence. Spikelets about 7 mm. long, lanceolate, 1-flowered, the bracts 2-ranked. Bracts about 7, all excepting the uppermost cuspidate. (Fig. 2b). Perianth bristles none. Stamens 3. Style at least as long as the ovary, sometimes longer, with 3 branches. Fruit broadly ellipsoidal, trigonous, with a well developed hispid beak. (Fig. 3c).

Hab. Cape Province: Cape Division; Bushy places on the lower mountain slopes, Kirstenbosch, *Esterhuysen* 11808. (*Type*, in the Bolus Herbarium).

Flowering season. August to November.

***Tetraria graminifolia*, Levyns sp. nov.**

T. cuspidata (Rottb.) C.B.Cl. affinis sed foliis longis, gramineis, spiculis pallido-brunneis, bracteis paleaceis, ovariis stipitatis, stylis elongatis differt.

A densely tufted grass-like perennial, about 40 cm. high. Leaves all basal, numerous, slender, pale green, about as long as the flowering stems: the sheaths firm, reddish brown at the base, paler above: the lamina flat, slightly channelled, becoming more deeply channelled higher up, margins in the upper part scabrous: the ligule scarcely membranous, 2-lobed, the lobes obtuse. (Fig. 1c). Aerial stems slender, with many spikelets in a much contracted panicle towards the apex. Bracts on the main stem leaf-like, far exceeding the spikelets. Spikelets about 7mm. long, pale brown, chaffy, the bracts 2-ranked, 1-flowered. Bracts 5—6, the lower aristate, the upper obtuse. (Fig. 2c). Perianth bristles reduced to 3 minute lumps alternating with the stamens. Stamens 3. Ovary shortly stipitate, the style longer than the ovary, conical at the base and hispid, style branches 3. (Fig. 3d). Fruit ellipsoidal, trigonous, the cell outlines in longitudinal rows visible on each face, the beak inconspicuous and wrinkled. (Fig. 3e).

Hab. Cape Province: Cape Division; On the western slopes below Lion's Head, from 600 to 1,200 ft., *Levyns* 7917. (*Type*, in the Bolus Herbarium).

Flowering season: July to November.

***Tetraria paludosa*, Levyns sp. nov.**

T. cuspidata (Rottb.) C.B.Cl. affinis sed major, foliis longioribus, latero-complanatis, nucibus majoribus, angustioribus differt.

A densely tufted perennial about 1 m. high. Leaves all basal, rather

stout, about half the length of the flowering stems: the sheath firm, dark red: the lamina channelled at the base, soon becoming laterally compressed: the ligule short, the 2 lobes not apparent. (Fig. 1d). Aerial stems robust, bearing numerous spikelets in a contracted panicle. Bracts

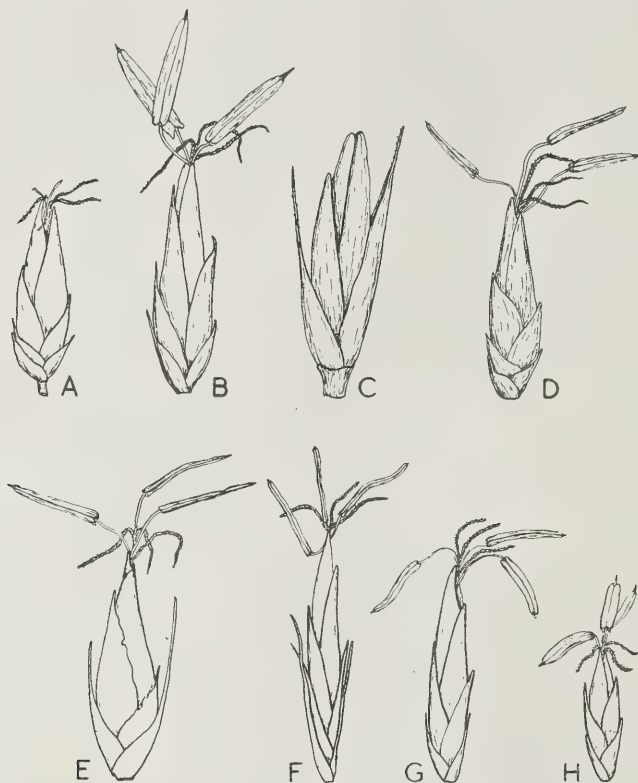


FIG. 2. Spikelets. (a) *T. cuspidata*, (b) *T. compacta*, (c) *T. graminifolia*, (d) *T. paludosa*, (e) *T. crassa*, (f) *T. variabilis*, (g) *T. autumnalis*, (h) *T. exilis*. All $\times 2\frac{1}{2}$.

similar to the leaves, the lower overtopping the inflorescence. Spikelets about 6 mm. long, lanceolate, 1-flowered, the bracts 2-ranked. Bracts about 7, the lower shortly cuspidate, the upper obtuse or nearly so. (Fig. 2d). Perianth bristles none. Stamens 3. Style short with 3 branches. Fruit ellipsoidal, trigonous, with a shortly hispid beak. (Fig. 3f).

Hab. Cape Province : Cape Division ; Marshy places near a stream above Camps Bay, *Levyns* 7915. (*Type*, in the Bolus Herbarium). *Pillans* 4864, collected on damp ground near a stream at Hout Bay, is this species.

Flowering season : August to November.

***Tetraria crassa*, Levyns sp. nov.**

T. cuspidata (Rottb.) C.B.Cl. affinis sed robustior, foliis majoribus, teretibus vel paulum complanatis, spiculis longioribus, stylis conspicuis differt.

A robust tufted perennial about 60 cm. high. Leaves all basal, rather more than half the length of the flowering stems : the sheaths firm, brown, with a reddish tinge at the base : the lamina stout, channelled at the base, becoming terete, eventually somewhat flattened : the ligule 2-lobed, the lobes obtuse. (Fig. 1e). Aerial stems robust bearing numerous spikelets in a contracted panicle. Bracts leaf-like, the lower overtopping the inflorescence. Spikelets about 7 mm. long, lanceolate, 1-flowered, the bracts 2-ranked. Bracts about 6, the lower aristate, the upper acute. (Fig. 2e). Perianth bristles none. Stamens 3. Style long and hispid, with 3 branches. Fruit apparently rather broad but no ripe fruits seen.

Hab. Cape Province : Cape Division ; From Smitswinkel Bay southwards, *Levyns* 6580. (*Type*, in the Bolus Herbarium).

Flowering season : April to June.

This is a much stouter plant than any of the other segregates of *T. cuspidata*. Its flowering season, general habit and ligule separate it from *T. paludosa*.

***Tetraria variabilis*, Levyns sp. nov.**

T. cuspidata (Rottb.) C.B.Cl. affinis sed brevior, spiculis longioribus, angustioribus, bisexualibus vel masculis, bracteis infimis aristatis, nucibus ellipsoideis, angustatis, paulum compressis, rostris parum tuberculatis differt.

A tufted perennial, from 20 to 40 cm. high, with all the spikelets bisexual or with some bisexual and some male, or with all male. Leaves all basal, stiff, wiry, about half the length of the flowering stems : the sheath firm, mahogany red : the lamina slightly flattened at the base, soon becoming terete : the ligule similar to the sheath in texture, the lobes obtuse. (Fig. 1f). Aerial stems with many spikelets in a contracted panicle. Bracts similar to the leaves, the lowest equalling or overtopping the inflorescence. Spikelets about 7.5 mm. long, 1-flowered, very narrow, dull brown, the bracts 2-ranked. Bracts about 7, the lower aristate, the aristae somewhat weak and scarious, the uppermost acute or nearly so.

(Fig. 2f). Perianth bristles none. Stamens 3, sometimes fewer in the male flowers. Style a little longer than the ovary, style branches 3. Fruit narrowly ellipsoidal, dorsally compressed, two ribs well developed, the third rather faint, the beak slightly tuberculate, not bristly. (Fig. 3g).

Hab. Cape Province: Cape Division; Sandy places from Smitswinkel Bay southwards, *Levy* 6054. (*Type*, in the Bolus Herbarium). The type specimen has both male and bisexual spikelets on the one plant.

Flowering season: April to June.

***Tetraria autumnalis*, *Levy* sp. nov.**

T. cuspidata (Rottb.) C.B.Cl. affinis sed spiculis angustioribus, stylis scabris, nucibus gracilibus, breviter stipitatis differt.

A tufted perennial about 40 cm. high. Leaves all basal, stiff, wiry, about half as long as the flowering stems: the sheath firm, red at the base, paler above: the lamina channelled at the base, soon becoming terete: the ligule short. (Fig. 1g). Aerial stems wiry bearing several spikelets in a contracted panicle. Bracts leaf-like, the lower exceeding the inflorescence. Spikelets about 6.5 mm. long, 1-flowered, narrow, dull brown, the bracts 2-ranked. Bracts about 6, the lower acuminate, the upper acute. (Fig. 2g). Perianth bristles none. Stamens 3. Style scabrous, a little longer than the ovary, style branches 3. Fruit narrowly ellipsoidal, trigonous, shortly stalked, the beak scabrous. (Fig. 3h).

Hab. Cape Province: Cape Division; Near Sirkel's Vlei, in sandy hollows which are damp during the winter months, *Levy* 6232. (*Type*, in the Bolus Herbarium).

Flowering season: April to June.

***Tetraria exilis*, *Levy* sp. nov.**

T. cuspidatus (Rottb.) C.B.Cl. affinis sed minor, foliis capillaceis, latero-complanatis, stylis longioribus, nucibus angustate ellipsoideis, rostris hispidulis differt.

A tufted perennial from 20 to 30 cm. high. Leaves all basal, very slender, one half to one third the length of the flowering stems: the sheath firm, dark red: the lamina slightly channelled at the base, soon becoming laterally compressed and oval in section: the ligule short and obtusely lobed. (Fig. 1h). Aerial stems slender, wiry, terete or slightly flattened, with several spikelets in a contracted panicle. Bracts similar to the leaves, the lower usually overtopping the inflorescence. Spikelets about 4 mm. long, 1-flowered, brown, the bracts 2-ranked. Bracts about 6, acuminate. (Fig. 2h). Perianth bristles none. Stamens 3. Style longer than the ovary, style branches 3. Fruit narrowly ellipsoidal, trigonous, the beak shortly hispid. (Fig. 3j).

Hab. Cape Province : Cape Division ; Widely scattered among bushes on the flats and mountains but never very abundant, *Levy* 7566. (*Type*, in the Bolus Herbarium).

Flowering season : April to June.

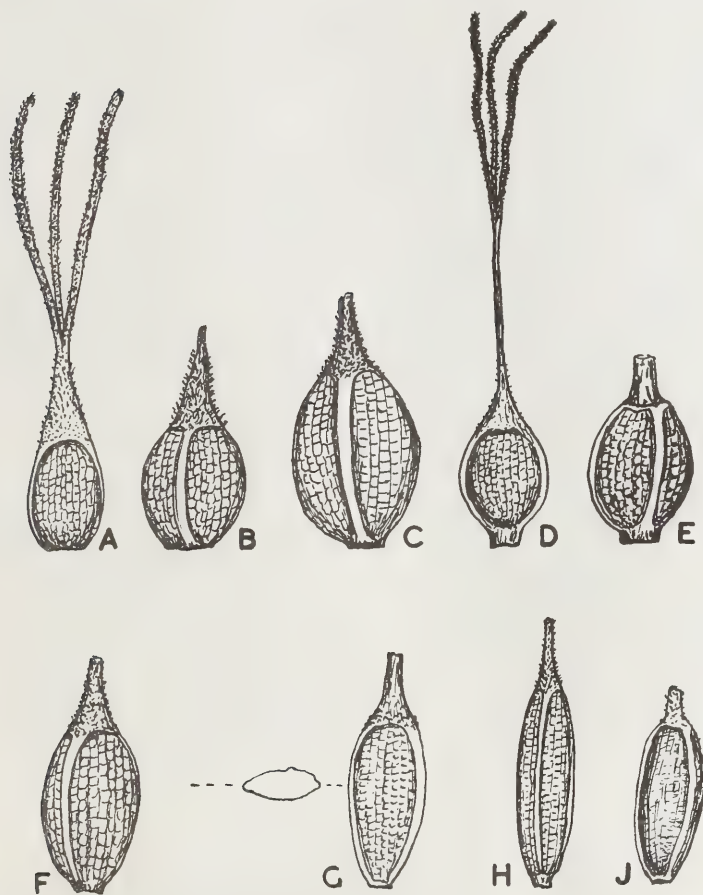


FIG. 3. (a) Gynoeceum of *T. cuspidata* ; (b) Fruit of *T. cuspidata* ; (c) Fruit of *T. compacta* ; (d) gynoeceum of *T. graminifolia* ; (e) fruit of *T. graminifolia* ; (f) fruit of *T. paludosa* ; (g) fruit of *T. variabilis* ; (h) fruit of *T. autumnalis* ; (i) fruit of *T. autumnalis* ; (j) fruit of *T. exilis*. All $\times 10$.

***Tetraria brachyphylla*, Levyns sp. nov.**

T. compar (L.) Lestib. affinis sed foliis paucis, vaginis rigidis, inflorescentiis exilibus, nucibus rostris turbinatis fere levibus differt.

A densely tufted perennial, about 60 cm. high. Leaves few, all basal, the lamina usually less than 10 cm. rarely as much as 20 cm. long : the sheaths tightly clasping the stems, smooth, shining, brownish red : the lamina flat, very slender, the margin minutely toothed : the ligule scarious, 2-lobed. (Figs. 4b, c). Aerial stems terete, deep green, firm and slender, terminated by an inflorescence of 3—6 spikelets. Bracts leaf-like, overtopping the spikelets. Spikelets about 10 mm. long, reddish brown, usually in pairs, the one sessile the other shortly stalked, the bracts more or less 2-ranked. (Fig. 4d). Sterile bracts at the base of each spikelet 4—5, the lower with a conspicuous leaf-like tip, the upper mucronate. Fertile bracts obtuse the lower flower with an abortive gynoeceum, the upper bisexual. Perianth bristles none. Stamens 6, rarely 8. Style branches 3. Fruit smooth below, faintly trigonous, crowned above by an almost smooth, conical cap with faint longitudinal furrows, the cap continuous with the lower part of the fruit. (Fig. 4e).

Hab. Cape Province : Cape Division ; The eastern slopes of Kapitein's Peak, Hout Bay, about 800 ft., *Levyns* 8093. (*Type*, in the Bolus Herbarium); *Pillans* 4777, collected between Slangkop and Witsands is this species. The latter was cited by Kükenthal as *Tetraria sylvatica* C.B.Cl. var. *pseudocuspidata* Kük.

This species is closely related to *T. compar* (Figs. 4a, f) from which it differs in its much reduced leaves with firm, smooth brownish red sheaths, in its inconspicuous inflorescence and in its distinctive fruit. The fruits of the two species (Figs. 4e and f) were drawn from living material at the same stage of development. The tubercles on the upper part of the fruit of *T. compar* become less conspicuous and eventually disappear in old dried material, but the surface remains rough. In *T. brachyphylla* the sterile cap is continuous with the lower part of the fruit. In *T. compar* this is not so and the sterile apex bulges over the lower part thus separating sharply the two parts of the fruit from one another.

Flowering season: During the winter months, fruiting from October to January.

***Tetraria pygmaea*, Levyns sp. nov.**

T. microstachys (Vahl.) Pfeiffer (*T. circinalis* C.B.Cl.) affinis sed spiculis minoribus, bracteis obtusis, eciliatis, setis hypogynis 3, minutis, pilosis, nucibus obovoideis, tomentosis praesertim supra, gynophoriis brevibus, crassis differt.

A tufted perennial, 15 cm. high or less. (Fig. 5a). Basal leaves firm

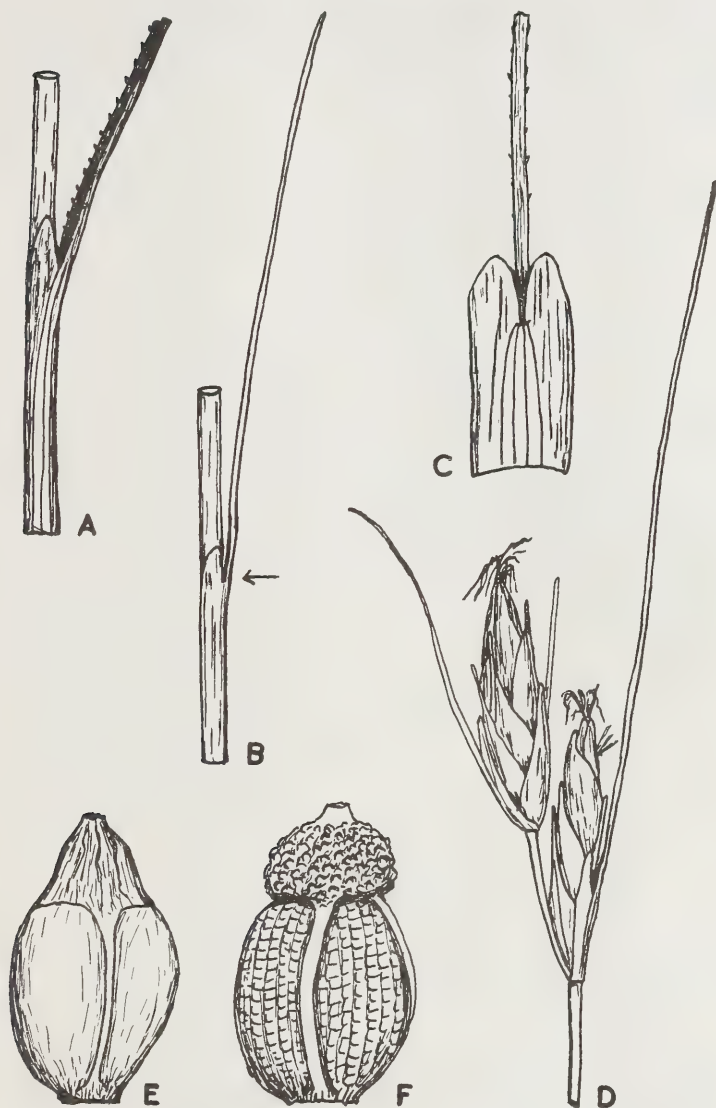


FIG. 4. (a) Top of the leaf sheath, base of the lamina and ligule of *T. compar* $\times 2$. (b) The same in *T. brachyphylla* $\times 2$. (c) The same part of the leaf split open and opened out in *T. brachyphylla*. Viewed from within $\times 2$. (d) The two uppermost spikelets in the inflorescence of *T. brachyphylla*. $\times 4$. (e) Fruit of *T. brachyphylla* $\times 10$. (f) Fruit of *T. compar* $\times 10$.

in texture, shorter or longer than the aerial stems: the sheaths pale brown, entire at first, at length somewhat fibrous: the lamina flat and involute below, narrowing and becoming semi-circular in transverse

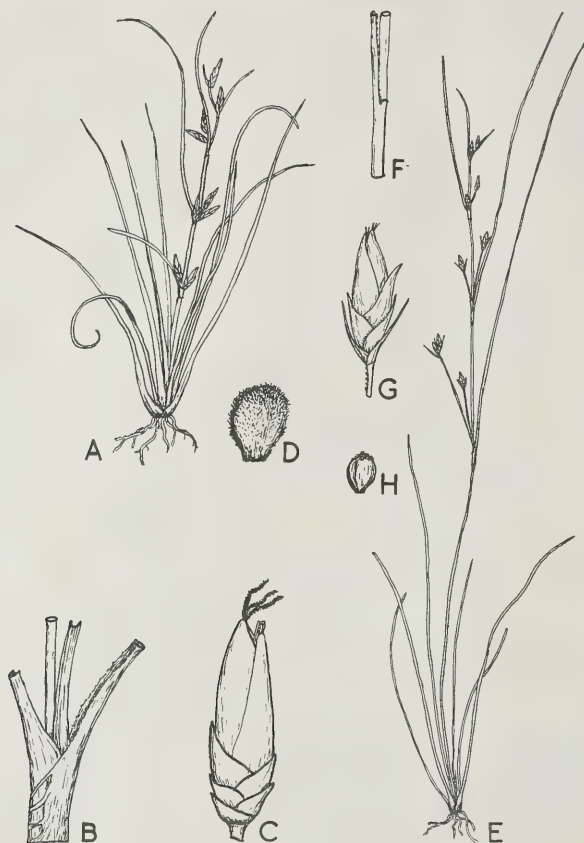


FIG. 5. *T. pygmaea*. (a) whole plant, one quarter natural size. (b) leaf at the junction of sheath and lamina nat. size. (c) Spikelet $\times 2\frac{1}{2}$. (d) Fruit $\times 2\frac{1}{2}$. *T. Pillansii*. (e) Whole plant, quarter natural size. (f) Leaf at the junction of sheath and lamina natural size. (g) Spikelet $\times 2\frac{1}{2}$. (h) Fruit $\times 2\frac{1}{2}$.

section towards the apex. (Fig. 5b). Cauline leaves similar but with entire sheaths, some overtopping the inflorescence. Aerial stem cylindrical at the base, channelled above, bearing a few yellow-brown spikelets on short axes at the nodes. Spikelets about 6 mm. long. (Fig. 5c). Bracts

2-ranked, obtuse, the 5 or 6 lower sterile, the two uppermost bearing flowers. Lower flower male with an abortive gynoeceum, the upper bisexual. Perianth bristles 3, minute, hairy. Stamens 3. Style much longer than the ovary, with 3 branches. Fruit bluntly obovoid, faintly trigonous, on a short, thick stalk, softly tomentose, the hairs more plentiful towards the apex. (Fig. 5d).

Hab. Cape Province : Cape Division ; Sandy ground a few miles south of Smitswinkel Bay. *Levyns* 6058. (*Type*, in the Bolus Herbarium).

Flowering season : February to April.

Tetraria Pillansii, *Levyns* sp. nov.

T. Burmannii (Spreng.) C.B.Cl. affinis sed foliis basaliis brevioribus dimidio inflorescentiis ; spiculis paucis, parvis ; bracteis circiter 7, infimis minute ciliatis ; setis hypogynis nullis ; nucibus obovoideis, pubescentibus supra differt.

A tufted perennial, 25 cm. high or less. (Fig. 5e). Basal leaves usually not more than half the length of the aerial stems : the sheaths pale brown, entire at first, eventually breaking up longitudinally into fibres : the lamina very slender, flat at the base ; channelled higher up. (Fig. 5f). Cauline leaves similar but with entire sheaths, some overtopping the inflorescence. Aerial stem slender, bearing a few light brown spikelets on capillary lateral axes at each node. Spikelets about 4 mm. long. (Fig. 5g). Bracts about 7, 2-ranked, a few of the lower minutely ciliate, cuspidate or acute. Lower flower male with an abortive gynoeceum, the upper bisexual. Perianth bristles none. Stamens 3. Style with 3 branches. Fruit obovoid, trigonous, very shortly stalked, minutely pubescent on top, glabrous elsewhere. (Fig. 5h).

Hab. Cape Province : Cape Division ; Gravelly slope among bushes at Kirstenbosch, *Levyns* 8091. (*Type*, in the Bolus Herbarium)

Flowering season : January to February.

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